PRELIMINARY IMPRESSIONS OF ARCHEOBOTANICAL WORK AT CIHUATAN

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Prior to the occupation of the site (and recent land clearance 30-40 years ago) the area was probably covered by a fairly dense Semi-Humid Deciduous or Monsoon Forest with Tropical Evergreen Rainforest elements occuring along semi-permanent drainages. Dominant species and their relative proportions are suggested by Dona Adelita's relict woodlot and the Cerro Colima forest on the banks of the Rio Lempa. In the woodlot, the canopy trees are Calycophyllum candidissium (salamo), Ceiba pentandra (pochote), Enterolobium cyclocarpum (conacaste), Copaifera himenefolia (quiebra-hacha), Cedrela odorata (cedro), and Bursera simaruba and possibly B. graveolens (jiote). Because the woodlot is relatively young and somewhat recently disturbed there is not a clear distinction between mid-story and understory. Trees in this medium size range include Morus celtidifolia (mora), Pithecollobium sp. (conacaste blanco), Erythoxylon mexicanum (coca), Cordia alba (tiguilote), Cochlospermum vitifolium (tecomasuche), Acacia cornigera (iscanal), Acacia hendsii (iscanal), Acacia farnesiana (espino blanco) and Piper trigetum (cordoncillo). The Cerro Colima forest because of larger size with a corresponding increase in microhabitats, and a longer period of non-disturbance, has a few more species and more pronounced stratification. Conacaste and Ficus glabrata (chilamate) become true canopy emergents. Other overstory trees are ceiba, jiote, salamo, Tabernaemontana Donnell-Smithii (cojon de Puerco), Plumeria acutifolia (flor de Mayo), Cecropia peltata (guarumo), and Sapium macrocarpum. Rainforest elements such as figs, Castilla elastica (palo de hule), and Bactris subglobosa (huiscoyol) can be found along small springs and drainages. Wild papaya (Carica papaya) is found in open areas. The banks of the Rio Acelhuate near the ruins of Cihuatan, also provide a refugium for rainforest elements.

During the occupation of the site, the area probably looked much as it does today. Because of relatively continuous use and possible intentional weeding, the ceremonial center was probably kept rather

clear. I've often wondered if some of the obsidian blades around the site couldn't have been hafted into a wooden handle forming a composite-blade machete for grass trimming. This idea should be testable because cutting grass should leave an opaline polish on blades used in this way. Tall trees such as ceiba, conacaste, jiote, and jobo (Spondias mombin)could have been left around to provide shade. Despite the romantic illustrations by Catherwood in Stephen's Travels in the Yucatan, of strangler figs covering Mayan temples, I doubt if this ever occured while a temple was in use. The damage done by roots would be disasterous. Also if the Cihuataneros followed the Mesoamerican practice of rebuilding every 52 years, very dense plant cover could not get established on buildings.

The Mexican-Guatemalan-Honduranian practice of dooryard gardens does not seem as well established in the Aguilares area, but that may reflect recent settlement. Nevertheless, many houses have small orchards around them that provide both shade and food. Quite probably the terraces in residential areas of the site, and the steeper erosion control terraces around the ceremonial center could have been planted with economically useful and aesthetically pleasing tree species such as morro, jobo, jocote, mamey, sapote, cashew, chaparro (Curatella americana), mamon, nance, balche (Lonchocarpus rugoso), annona, tiguilote, guayava, capulin (Muntingia calabura), and avocado, all of which can be found growing in the Aguilares area today. I've recovered nance by flotation from Preclassic levels at Cuello in Belize, tiguilote from Classic horizons at Chapernalito, and jobo from Preclassic and Classic levels from Santa Leticia (both of the latter sites are in El Salvador).

Milpas for the cultivation of maize, beans, squash, and cotton probably located in better agricultural land on the floodplain of the Rio Acelhuate. Less fertile, shallow, rocky land on the ridge-tops may have been reserved for residence areas.

In order to test hypotheses about environment and subsistence, flotation samples were collected from various excavated contexts. A 35 l. (three bucket) volume was utilized as a standard which seemed

to provide adequate recovery. Because of problems with water availability and the transportation of such large volumes of soil, rainwater was collected so flotation could be performed right on the site. Once dried, the samples were analyzed in our field lab with preliminarily identified material being saved for confirmation.

The results of flotation are summarized in Tables 1 and 2.

The excavated areas were in a plowed field that has been seasonally cleared by burning. Plowing with a steel-tipped wooden plow mixed soil to a depth of 10 or 15 cm. In order to avoid modern contamination, samples were only collected below the plow zone from contexts that had numerou large-sized sherds. In Structure A (Excavation Unit 1), these contexts were interpreted to be near-primary trash in construction fill. Most samples from the Temple Mound came from well below plow zone. Another potential source of contamination is the large cracks in the soil, described by Dona Adelita, that develop during the dry season. Burnt seeds from field clearance could fall into these cracks and become incorporated into otherwise undisturbed deposits. Migration of material in the soil caused by burrowing animals and insects is also possible. In interpreting Tables 1 and 2, the number of flor amarilla, escobilla, Desmodium, morning glory, and Unknown A can be used as a partial guide to the amount of disturbance in a deposit. It must also be emphasized that these seeds can also be reflections of the daily lifestyle and environment of the prehistoric Cihuateneros.

Flotation samples from Structure A (See Table 1) reflect a pretty good cross-section of daily life at prehistoric Cihuatan. Basic subsistence is suggested by the recovery of all elements of the New World maize-beans-squash triumverate. Tree fruits, huiscoyol and cashew, are present. Cotton for clothing is present. Cacao for consumption as a beverage or for commerce is suggested. Even the beggar's lice (Desmodium) picked off the loincloth after a hard day in the fields was recovered, as were numerous weedy elements of the local flora, e.g. grass, flor amarilla, mimosa, and escobilla. The morning glory seeds are interesting since the seeds of some species of Ipomoea and Rivea contain lysergic acid derivatives and were consumed as hallucinogens in Oaxaca. Some members of the Convolvulaceae are also used in

El Salvador as a quelite. By the same token, the morning glory seeds could just be members of the background flora.

Of particular interest, is the fact that 81% of the wood charcoal from Structure A is pine and there are no pines growing on or near the site. The nearest definite location for pines is the foothills near La Palma, at least 35 km. air distance from Cihuatan. In times past, pines could have grown on Guazapa, 10 km. away as the crow flies, and they could have been cut and floated down the Acelhuate to the site. Pine which grows straighter and is more easily cut with stone axes may have been a more desirable wood for construction than local hardwoods. Segments of pine were also used as torches by the Mayans.

Economy at Cihuatan

Initially, Karen Bruhns suggested that the Cihuatan area may have been important for the production and trade of cacao. I find this hypothesis untenable. Cacao is currently a very minor crop in El Salvador, with one small plantation in the San Miguel area. Cacao grows best in an area with 45 to 100 in. of rain a year (Cihuatan has 67), and soil with a pH between 6 and 7.5 (Cihuatan should range around 6.1 to 6.25 based on analyses of similar soils in Las Nuevas Clasificaciones y Los Suelos de El Salvador). The real problem is that cacao requires a short, mild dry season. The Cihuatan area has a severe four month dry season with December through March averaging less than an inch and a half of rain. For precipitation records from the Inginio "La Cabana" 75% of the records for January between 1957 and 1978 and 50% of those for February show no measurable precipitation. Even with irrigation, water stress for cacao during these months would be severe. (Data for cacao from Cacao by G.A.R. Wood, 1975, Longman Group Limited, London.)

If cacao is eliminated as an economic base for Cihuatan, what then? In his report to the King of Spain in 1576, Diego Garcia de Palacio mentions that there is nothing worth mentioning in the area around Santa Ana but two types of wood, one of which turns water fawn-colored and the other, blue.

El Salvador. Historia de sus Pueblos, Villas, y Ciudades by Jorge Larde y Larin (1957) contains numerous mentions of crops for villages in the Cihuatan area between 1740 and 1807:

Guazapa. 1807. "se cultivan todos frutos y semillas y se labora anil." (p. 177)

1740. "Tonacatepeque producia maiz, algodon, cana, gallinas y ganado de cerda." (p. 517)

1740. Nejapa. "Las producciones naturales eran maiz, gallinas, algodon, ganado de cerda, y cana." (p. 259)

1807. Nejapa. "cultivo de anil, maices y otras semillas" (p. 259)

Santa Ana. 1807. "La unica ocupacion de sus habitantes....a excepcion de los tejidos de algodon con algun merito y exclusivos en la cabecera, es el cultivo de arroces, cana dulce, maices, frijol y raices, que consumen con alguna porcion de azucares y anil que destinan al trafico y comercio." (p. 419)

Aguilares was settled in the 1930's so it is too recent for historical references.

Despite the current trend of growing cotton near the coast of El Salvador, these references suggest that cotton and also indigo were once important crops in the Cihuatan area. In fact until the early 1900's indigo (anil) was the major export of El Salvador.

There has always been some debate as to whether indigo and the dye extraction process were introduced by the Spanish, but this seems to be an ethnocentric European argument. The local name for indigo, xiquilite, comes from Nahuatl words for blue___xi___ and herb___quitiel or turquoise, herb___xiutil___and blue___texutli. Anil is mentioned both in the Mayan book of Chilam Balam and Landa's Relaciones of the Yucatan. The genus Indigofera has at least three native species in Central America, the most commonly utilized being sufruticosa which grows wild on the ruins of Cihuatan.

Spindle whorls are a very common artifact in excavations at Cihuatan.

Two seeds tentatively identified as cotton were recovered from Structure A.

The unidentified heart-shaped legume seeds from Structure A may be indigo. (Since indigo doesn't flower until November we were unable to collect seeds for comparison, but we do have some in the comparative

collection at University of Arizona courtesy of Barney T. Burns and the Tarahumara so this identification can be checked.)

Several lines of evidence suggest that cotton and indigo production may have been important to the subsistence economy of Cihuatan. Dyed cotton yarn and textiles may have been one product produced at Cihuatan for export.

A number of plants mentioned by Guzman in Especies Utiles de la Flora Salvadorena (1976) could have been important to the postulated textile industry at Cihuatan. Ceiba or pochote (Ceiba pentandra) produces a light, silky, weavable fiber. There are also a number of other dye plants (Guzman, Tomo 2, p. 348-349) native to the Cihuatan area:

achiote	Bixa orellana	yellow, red
aromo	Acacia farnesiana	yellow
limoncillo	Zantoxilum perroti	yellow
palo mora	Morus celtidifolia	yellow
campeche	Hematoxylon campechianum	brilliant red, blue (depends on pH)
nance	Brysonima crassifolia	scarlet
palo brasil	Cesalpinia echinata	red ocre
pitahaya	Acanthocereus pentagonus	carmine
morro	Crescentia cujete	blue
conacaste	Enterlobium cyclocarpum	black
mamon	Meliccoca bijuga	black

To this list I would like to add tecomasuche, Cochlospermum vitifolium which has brilliant yellow inner bark which could be used as a dye.

If the oven associated with Feature 12-1 does indeed turn out to be a copper smelter, the textile industry and metallurgy would combine to make Cihuatan an important Mesoamerican trade center for the southern hinterlands.

Products that would have to be imported into Cihuatan could include salt and dried fish from the coast; pine for construction and torches; copal from Guatemala and Honduras for the incensarios at the site; cacao from southern El Salvador, Honduras, Guatemala, or Nicaragua

hardwoods such as mahogany or cedro from the Guatemalan and Honduran rainforests; and obsidian from Guatemala (if it isn't available locally from Guazapa).

Cihuatan could have occupied a very strategic position on Post-classic trade routes between the south (Nicaragua and Costa Rica) and the Guatemalan and central Mexican highlands.

HOUSE A

Excavation Unit 1

TABLE 1

	0N 10E 10-20	2N 6E 20-30	2N 6E 30-40	2N 10E 30-40	2N 10E 40-50	4N 8E 20-30	6N 10E 20-30	6N 10E 30-40	TOTALS	% OF SAMPLES WITH TAXA
Maize kernels	2		1	1			1	1	6	63
Maize cupules		1	1				3		5	38
Large common bean	1								1	12
Small common bean	1		1		4		1		7	50
Squash rind						1	1		2	25
Gossypium hirsutum (cf)			1					1	2	25
Theobroma cacao (cf)	1								1	12
Cashew (cf)				2					2	12
Piscoyol Palm							1	1	2	25
Panicoid Grass								1	1	12
Unstucoid Grass	1							1	2	25
Unknown Legume ♡	10		1					3	14	38
Small Morning Glory	8		4	1	12	6		1	32	75
Unknown Seed Type A	110	3	15	21	16		3	18	186	88
Flor Amarilla	8		2		1	1			12	50
Beggar's Lice (Desmodium)	29	1	14	8	14	1	6	3	76	100
Escobilla (Sida)	11		2		7	1	1		22	63
Mimosa-Sensitive Plant			2		1		2		5	38
Composite			2						2	12
										% of Wood Charcoal
Wood Charcoal:										
Large Resin Duct Pine	1	7	7	2	8	2	9	7	43	62
Small Resin Duct Pine		5	4	2		2			13	19
Legume (large vessels, small rays)	1			1		1		2	5	7
Legume (medium vessels, wide rays)							2		2	3
Non-Legume (large vessels, small rays)	1	1				1			3	4
Tiny dense vessels, wide rays	2					1			3	4

cf indicates a tentative identification that needs further confirmation

mple

cavation Unit 2

Partial List)

ble 2

	2N 11E 40-50	2N 11E 50-60	6N 7E 30	9N 21E 20-50	9N 21E 50-60 (around oven)	14N 8E 60-80	17N 10E 25	Trench 2 Segment R 50-70	Total	% of Samples with Taxa
all Common Bean				3					3	11
Panicoid Grass								1	1	11
known Type A				6			1		7	22
Small Morning Glory	1			10					11	22
rge Morning Glory				4					4	11
Flor Amarilla				4					4	11
ggar's Lice(Desmodium)	1	1		4					6	33
Escobilla (Sida)				13				1	14	22
all Kidney Shaped Legume		1							1	11
Unknown Type B						2	1		3	22
od Charcoal:									% of Wood Charcoal	
Small Resin Duct Pine						2			2	7
Elm		1		3					4	13
Legume, small triplet vessels, narrow rays					1				1	3
Legume, small single vessels, narrow rays					2				2	7
Large single vessels, narrow rays		6					5		11	37
2 vessels/duct, narrow rays						2		2	4	13
Tiny dense single vessels, narrow rays			1	2		2			5	17
Tiny sparse vessels, wide rays		2							2	7
Tiny dense vessels, wide rays				1					1	3